Phases of the Moon

Suggested Age / Grade Level	Curriculum Covered	Duration
Grade 3 - 8 (8 - 13 years old)	● Moon and earth interaction ● Phases of the moon ● High tides and low tides	1 hour

Overview

In this lesson, campers will learn about the Moon, Earth and the different phases the moon undergoes within a lunar month. They will also be introduced to the concept of gravity and tidal forces which play a role in high tides and low tides of the sea. For the activity, they will get to draw and make their own phases of the moon flip book.

Learning Goals

- Understand how the moon interacts with the Earth
- Learn the different phases of the moon
- Understand how the phases of the moon affect sea high tides and low tides

Key Terms

Moon - Any astronomical body that orbits a planet within our solar system
Moonlet - Moons that have a smaller diameter than a typical moon
Phases of the Moon - The shape changes of the moon that we see on Earth
Lunar Month - Total time it takes for the moon to go through all of the 8 phases (approx. 30 days!)
Tides - Waves that last for a long time because of the moon's gravity
Gravity - The pulling together of all matter
Tidal Force - The mass of an object affects another object with its gravity
High Tide - When the water of the sea it at its highest point
Low Tide - When the water of the sea is at its lowest point
Neap Tides - Tides that occur during the moon's quarter phases

Lesson Summary

Phases of the Moon

- The moonlight we see on Earth is not coming directly from the moon. What we see is sunlight reflecting off of the moon's surface.
- As the moon orbits the Earth, the Sun lights up different parts of the moon which makes it look like the moon is changing shape.
- The moon doesn't actually change shape. We see more or less of it depending on how much sunlight is reflecting off of the moon.
- The change in shape represents the phases of the moon, which are part of the lunar cycle.
- It takes 27 days for the moon to orbit around the Earth once. While the moon orbits the earth, the earth is also orbiting the sun. It takes about 30 days for the moon to go through its 8 phases.
- There are 8 phases of the moon.
    1. **New Moon** - the moon is completely dark because the side of the moon we see is not reflecting any sunlight
    2. **Waxing Crescent** - waxing meaning growing and crescent is the shape of the light we see
    3. **First Quarter** - also called half moon because from Earth the moon looks half lit. it's officially called first quarter because the moon it a quarter of the way through its cycle
    4. **Waxing Gibbous** - gibbous means swollen and waxing refers to the moon continuing to grow and get thicker every night
    5. **Full Moon** - the moon is at its biggest and brights; it's the easiest phase to see
    6. **Waning Gibbous** - waning means getting smaller/thinner, gibbous means swollen
    7. **Third Quarter** - the moon is three quarters (3/4) of its way through the lunar cycle
    8. **Waning Crescent** - part of the moon lit by light is in the shape of a crescent. Waning refers the moon getting smaller
    - Since this is a cycle, the waning crescent becomes the new moon again

The Moon and Tides

- The moon's gravitational pull creates a tidal force that causes the Earth and its waters to bulge out towards the moon.
- When the moon's gravity pulls on the land part of Earth, the effect of the pull is not noticeable.

- When the moon's gravity pulls on the water parts of Earth, the effect is more noticeable because it creates a bulge in the direction of the moon. This force creates a high tide.
- When there's no bulging in the direction of the moon, we see a low tide.
- When the sun works against the moon's gravitational pull, we get the highest low tides and lowest high tides.
- The sun, Earth and moon are perfectly aligned during the moon's new moon phase and full moon phase. As a result, we get the highest high tides and the lowest low tides because the extra gravitational force from the sun creates a large bulge.

Materials Needed

- Nine 3" x 4" paper
- Drawing utensils (black marker works best)
- String (2 pieces)
- Hole puncher
- A perfect circle to trace

Procedure - Activity

1. Draw one circle on eight pieces of paper. The ninth paper will be used to create a title page.
2. Use a black marker to colour in the eight phases of the moon. Each sheet of paper should have a different lunar phase.
3. Write the name of the lunar phase at the top or bottom of the piece of paper.
4. Create a cover for the flipbook using the last piece of paper. You can be as creative as you'd like with the title page. Make sure to include a title.
5. Organize the pages in order, starting with the title page.
6. Punch two holes on one side of the pages. Bind the pages together using two pieces of string.